

**LOGISTICS AND MANUFACTURING VALUE CHAINS:
MEETING THE WORKFORCE AND INFRASTRUCTURE
DEMANDS OF A “REAL TIME” ECONOMY**



A Report of the
California Regional Economies Project
July 2005

Prepared By
Collaborative Economics, Inc.

PREFACE

THE CALIFORNIA REGIONAL ECONOMIES PROJECT

The California Regional Economies Project provides California's economic and workforce development system with information about changing regional economies and labor markets. The Project is a joint effort of the California Workforce Investment Board and the California Economic Strategy Panel. The Project was initiated in 2003 in response to these challenges:

- California's economy is under-performing relative to its potential—we have tremendous talent, world-class companies, and a tradition of innovation;
- California lacks an economic and workforce investment strategy that focuses on regional strengths and opportunities, and connects state and local efforts for maximum impact; and,
- Local and state policymakers lack reliable and timely information about emerging industry and job opportunities, making good investment and policy decisions difficult.

The Project develops information that measures the performance of California's regional economies. This information provides a key resource in economic and workforce development planning, and a bridge connecting economic and workforce policies and programs at the state and regional levels.

Through its products and forums, the California Regional Economies Project fills a need for better information that can:

- improve specific decisions about state, regional, and local workforce investments and policies;
- connect state, regional, and local economic and workforce investment strategies;
- focus state, regional, and local marketing efforts on areas of regional economic advantage and opportunity;
- inform policy and investment decisions of government so that they promote, rather than discourage economic innovation and competitiveness; and,
- help individuals navigate their own transition to new employment opportunities.

PHASES I AND II OF THE PROJECT: PRODUCTS AND FORUMS FOR USERS

During 2003-2005, information was compiled and updated for each of the nine California Economic Strategy Panel regions—Northern California, Northern Sacramento Valley, Greater Sacramento, Bay Area, San Joaquin Valley, Central Sierra, Central Coast, Southern California, and the San Diego Border Region (see following map).

Each of these reports was originally presented at a regional forum, and discussed with the regional user community (e.g., employers, workforce investment boards, local economic development organizations, local education and training institutions, local government agencies, and other interested community leaders). At each forum, users had the opportunity to discuss the findings and suggest priorities for further cluster analysis.

In addition, the Project compiled multi-region, cross-cutting Cluster of Opportunity reports. The focus for these reports was based on recommendations from the user community at regional forums and analysis of trends in the regional data. As a result, the Project focused on industries and occupations involved in:

- *Health Science and Services* (across all nine regions of California)
- *Manufacturing Value Chain* (the value chain of design, production, and logistics sectors in the five most urban regions of the state)
- *Regional Experience/Infrastructure* (in the four most rural regions California)

Each region was examined as part of two cluster reports, as shown below.

Regions	Health Science And Services	Manufacturing Value Chain	Regional Exp/Infra
Northern California	XX		XX
Northern Sacramento Valley	XX		XX
Greater Sacramento	XX	XX	
Bay Area	XX	XX	
San Joaquin Valley	XX	XX	
Central Sierra	XX		XX
Central Coast	XX		XX
Southern California	XX	XX	
San Diego/Border	XX	XX	

The Project Regions



Following these initial reports, the Project produced reports looking more closely at specific topics:

- *Role of Logistics in the Manufacturing Value Chain.* A focused examination of the forces stimulating the growth of logistics in California, including industry, regional and occupational impacts, and implications for economic and workforce development.
- *Patterns of Rural Entrepreneurship.* An overview of patterns using the comprehensive National Establishment Time Series (NETS) database of firms, including the growth in new firms, impact on rural job creation, movement of firms, and sectors accounting for most of the entrepreneurship in rural California.

The Project has also produced monographs focused on key policy areas of concern to the regional user community and state-level policymakers. These monographs are focused on:

- *The Conditions of Competitiveness of California's Economy.* This monograph provides a balanced look at California's business climate by examining both cost and productivity factors with a special focus on the role of talent.
- *Innovation, Productivity and California's Prosperity.* This monograph examines the role of innovation in changing industry clusters, the impact of innovation and technology on productivity as well as the impact of productivity on the dynamics of job change.
- *Creating a Workforce Transition System in California:* Based on the regional analysis, this monograph recommends how a workforce transition system could be designed to help workers make transitions both within industries through career progression from entry to mid and higher occupational levels as well as transition across industries through adjustment to structural economic changes.

The monographs reinforce findings from the cluster reports as well—namely the importance of a balanced business climate based on cost and productivity, the imperative of innovation across all industries, and the need for a more effective workforce transition system to support California employers in their drive to innovate and remain competitive in the global economy. All of the California Regional Economies Project products are available at www.labor.ca.gov/panel/.

Project Team and Sponsors

The Project Team has included Collaborative Economics (www.coecon.com), Center for the Continuing Study of the California Economy, (www.ccsce.com), California Center for Regional Leadership (www.calregions.org), and Action Research, Inc.

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Executive Summary

Manufacturing in California is rapidly transforming from “traditional” manufacturing – simply, the production of goods – into an integrated design, production and logistics system delivered in “real time” directly to the customer with less inventory and more design incorporated into every aspect of the system.

- Today, this “new” manufacturing is neither a single industry nor a single function. Rather, manufacturing has become an important part of a global value chain of interdependent business functions.
- Manufacturing remains an important source of employment for the state and most of its regions. However, employment in direct production has been declining while the functions of design support, and logistics have been outsourced in many cases to other companies, and have shown employment increases in most regions, even during the recent recession.
- Increasing productivity in the manufacturing value chain requires streamlining the supply chain by integrating logistics tasks and managing complex supplier relationships among many partners around the globe.
- Supply chain management is lowering sales to inventory ratios creating lower logistics and inventory carrying costs which is reducing consumer prices and increasing productivity.

Logistics is a growing industry in California, adding nearly 73,000 jobs between 1990 and 2003. Employment grew by 23% from 317,604 employees in 1990 to 390,506 employees in 2003. Logistics comprised 2.6% of all employment in the state and pays wages at about the average state level (\$42,592 for the state and \$42,475 for logistics in CA).

Logistics in California includes four key subsectors:

- *Transportation services* – the physical movement of goods from place to place by truck, air, water or rail freight transportation. Transportation services employs approximately 261,000 Californians and is 67% of all logistics employment in the state. Within transportation services, courier employment grew the fastest, averaging 11% employment growth annually from 16,200 jobs in 1990 to nearly 59,700 in 2003.
- *Logistics support* – activities supporting transportation services including air traffic control, navigational services to ships, packing and crating and freight transportation arrangement. In 2003, California had approximately 64,000 logistics support jobs, making up about 16% of all logistics employment.
- *Warehousing and storage* – facilities storing goods and general merchandise, including products requiring refrigeration and the storage of bulk

commodities. About 14% of all Logistics employment is in warehousing and storage – and the sector employed about 56,000 in 2003.

- *Supply chain management* – firms offering operating advice and assistance in productivity improvement, inventory management, and production planning, quality assurance and materials handling and transport. Supply chain management employment is 17% more concentrated in California than it is nationally.

Four urban regions function as the key “nodes” in California’s goods movement network: Los Angeles/Inland Empire, the Bay Area, San Diego/Border, and the San Joaquin region.

- Of the four regions, logistics employment in Southern California is by far the largest, with about 59% of all logistics employment in the state. Bay Area logistics employment declined by 9% between 1990 and 2003.
- More than 41,000 logistics jobs were in the San Joaquin region in 2003 – and the region is an increasingly important corridor supplying logistics support. Finally, San Diego is the smallest of the four regions, employing about 6% of the California logistics workforce.
- Employment figures broken out by functional areas and occupations indicate that within logistics about 35% of all jobs are in office and administrative support occupations and more than 45% of logistics occupations are in transportation and material moving occupations statewide.
- Within specific functions, the occupational pattern varies, but in each case the majority of logistics jobs (81%) offer mid-level wages, with salaries ranging from just over \$27,000 to approximately \$48,000.

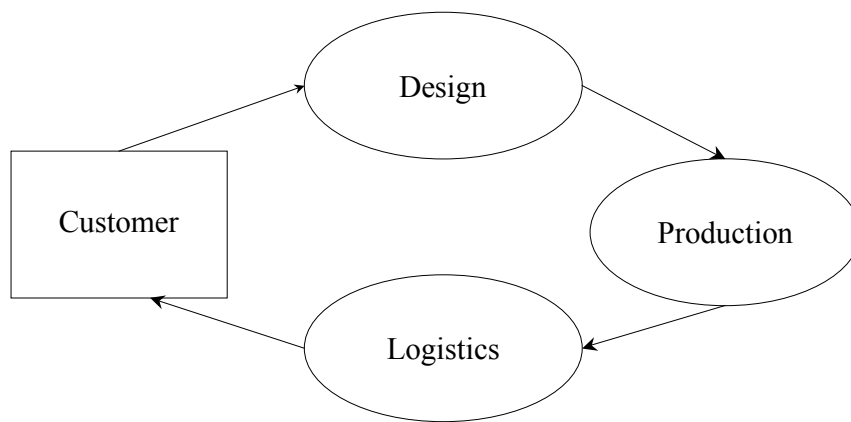
California’s goods movement infrastructure is under stress but career opportunities are being created in several growth areas.

- The State of California and its regions need to understand the opportunity presented by the growth of logistics as part of globally competitive manufacturing value chains and invest in the workforce and infrastructure require to meet increasing demand.
- Public and private investments in the logistics workforce training partnerships and infrastructure create “triple bottom line” benefits for the economy through increased of jobs and productivity; equity benefits through higher wages and opportunities for career progression; and the environment through reduced bottlenecks, waste and pollution.

The Transformation of Manufacturing in California

Manufacturing in California is rapidly transforming from “traditional” manufacturing – simply, the production of goods – into a design, production and logistics system delivered real time: directly to the customer with less inventory and more design in the process. In short, a “new” manufacturing is emerging in the regions of California, and it is both creating opportunities in some employment sectors and destroying jobs in other sectors.

The Manufacturing Value Chain



Manufacturing is neither a single industry nor a single function. Rather, today’s manufacturing can be thought of as a “system” or a value chain of interdependent business functions.

A 2004 study of manufacturing in California by the California Regional Economies Project found that manufacturing remains an important source of employment for the state and most of its regions. However, employment in “traditional manufacturing” or direct production has been declining while the functions of design support, and logistics have been outsourced in many cases to other companies, and have shown employment increases in most regions, even during the recent recession.

Figure 1: California’s Manufacturing Value Chain Sector

California’s Manufacturing Value Chain Sector				
Share of Employment	1990	1994	2000	2002
Design	11%	12%	14%	16%
Logistics	13%	15%	16%	17%
Production	76%	73%	69%	67%
Total Manufacture	2.2 million	2 million	2.3 million	2.1 million

Source: California Regional Economies Project, 2004

This analysis shows that despite a decline in production jobs, the design, logistics and support components in manufacturing have actually grown from 500,000 in 1990 to 700,000 in 2003 – with even more dramatic shifts in some regions. Understanding these new realities is critical to developing effective workforce and infrastructure investment strategies.

The Manufacturing Value Chain contains three vital components:

- *Design* companies specializing in engineering services, specialized design, and management/technical consulting.
- *Logistics* includes the transportation, freight, warehousing, delivery and support firms specializing in moving goods from producers to customers, including other producers and end users.
- *Production* includes companies that directly produce a good. Within this category are producers of aeronautical & automotive goods, food & agriculture, furniture, metal & metal products, plastics & chemical goods, semiconductors & electronics, and textiles & apparel.

This monograph explores the implications of logistics, in the context of its role in the manufacturing value chain. A focused examination of the forces stimulating the growth of logistics in California, including industry and occupational impacts, and implications for economic and workforce development follows.

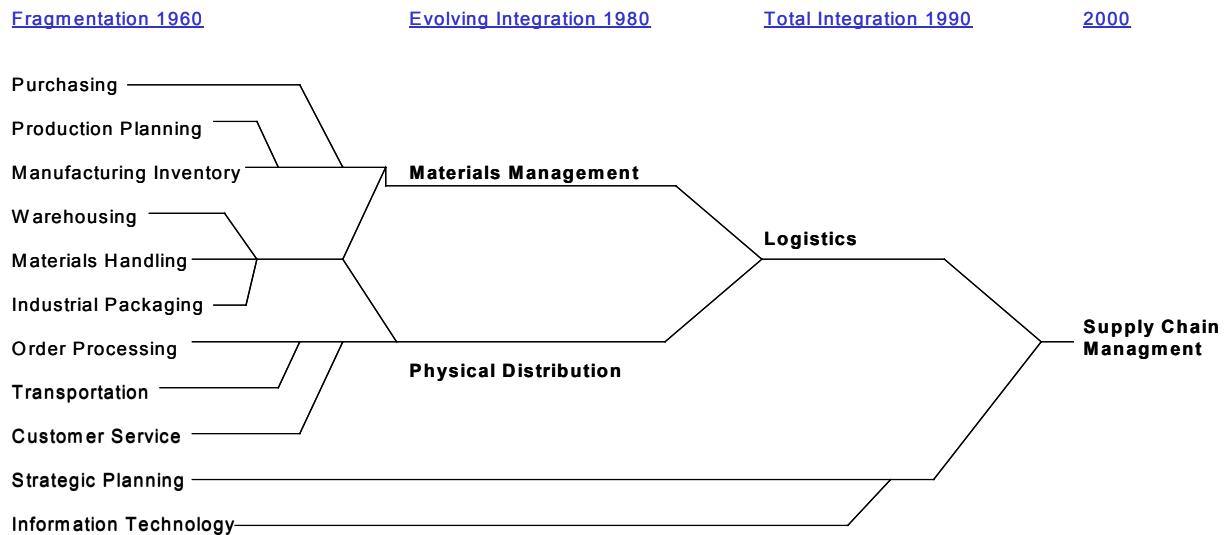
The Impact of Changing Manufacturing on the Logistics Function

Increasing productivity in the manufacturing value chain requires a new kind of logistics function with increased integration of activities and the management complex supplier relationships among many partners around the globe. Supply chain management (integrating materials management and physical distribution with strategic planning and information technology) is lowering sales to inventory ratios across the U.S. In the aggregate, firm's effective management of the supply chain has lowered logistics and inventory carrying costs which ultimately helps to increase firm competitiveness and reduce consumer prices.

Integration: From Warehousing and Storage to Supply Chain Management.

The logistics component of the manufacturing value chain has been shifting towards the increased integration of the various activities involved in the transportation process – as shown in Figure II, below. The integration of logistics (materials management and physical distribution) with strategic planning and information technology has resulted in the evolution of supply chain management.

Figure 2: The evolution of supply chain management



Source: Collaborative Economics

Increasing Importance of Highly Efficient Supply Chain Management

Global competition requires more sophisticated supply chain management as firms focus on dynamic core competencies, developing complimentary global partnerships to accomplish the work. Globally competitive firms must rid their value chains of inefficiencies to remain competitive.

According to the journalist Tom Friedman, the “world is flat.” Indian and Chinese economies now compete directly with U.S. firms through managing complex global supply chains involving partners all around the world. These business partnerships extend to all products and services including the marketing, design, production and distribution functions. New communications and transportation technologies have created rapid advances in helping to revolutionize how companies manage their global supply chains.

While this trend has been developing for many years, it is now coming into sharper focus with the rise of large, middle-class consumer markets in Asia. California is at the center of these changes both as a producer and a consumer.

John Hagel III and John Seeley Brown, former director of Xerox PARC, argue in their book, *The Only Sustainable Edge* that margin squeeze and new types of information technologies support the rise of new, adaptive strategies for business success. According to Hagel and Brown, the most competitive firms will enhance their core capacities by

developing complementary partnerships with firms around the globe. This will require new management and information sharing techniques to capitalize on the diversity of knowledge within a supply chain network.

One of the important tools for achieving a sustainable edge is effective orchestration of literally thousands and thousands of partners. This type of collaboration and orchestration is especially important in supply chain management which involves developing process networks with a wide range of specialized providers of materials and services. According to Hagel and Brown, effectively managing the “productive friction” among these partners will produce a creative edge for firms.

Globally competitive firms strive to wring inefficiencies from all aspects of the production process. In terms of the supply chain, this means gaining productivity from reduced inventory and logistical costs.

The Emergence of a “Real Time” Economy

As the California economy has transformed from mass production to lean production and now mass customization, logistics and supply chain management has become the key to creating a “real time economy” where products are designed and delivered directly to customers.

In this “real time economy”, information technologies have helped to streamline three aspects of the supply chain: the business channel, the transportation/distribution channel and the payments channel. Firms use information to find and acquire suppliers, to enforce contracts, maintain appropriate inventory levels, transport products to the next production process and to attract and retain customers.

Improved inventory management, streamlined logistics systems and various information sharing devices such as global positioning systems (GPS) and radio frequency identification devices (RFID), the Internet and other wireless telecommunication platforms all greatly improve supply chain operations.

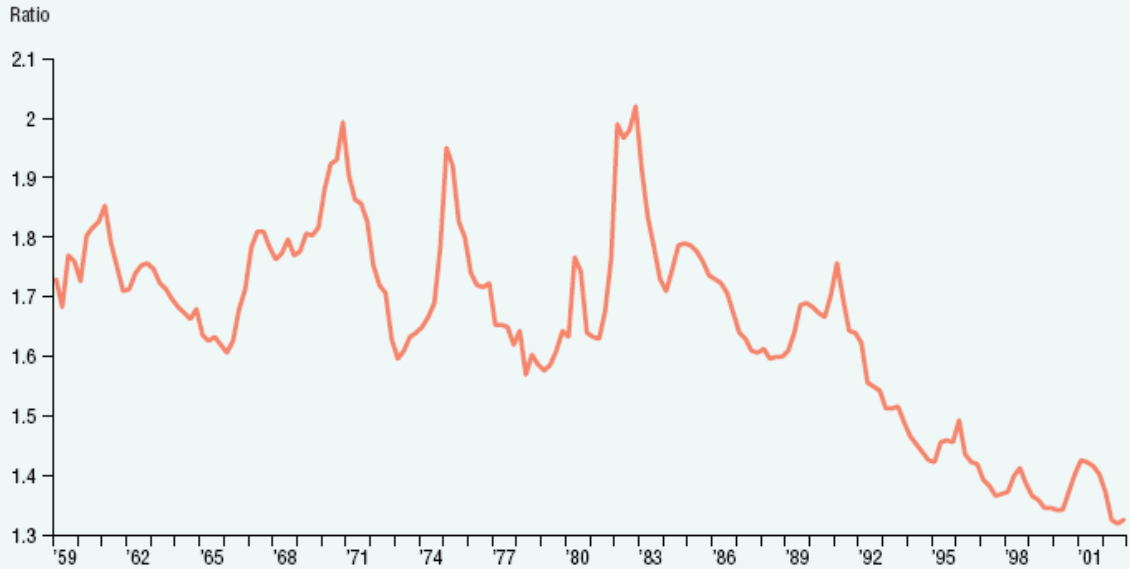
As inventories shrink relative to sales, inventory carrying costs have declined, reducing the overall cost of logistics. This is true even as firms have increased the complexity of their logistics networks.

According to the Federal Reserve Bank of Dallas, the aggregate result of streamlining the supply chain has been a reduction in the inventory to supply ratio nationwide as inventory carrying costs have fallen. (*The Impact of E-Business on Supply Chain Operations: A Macroeconomic Perspective*). A decline in inventory to sales ratio nationwide from a peak of approximately 2% in 1983 to 1.3% in 2000 has resulted in major cost savings for businesses as inventory carrying costs have fallen from over 5% in 1980 to 3% in 2000.

Figure 3: Inventory to Sales Ratio

Inventory/Sales Ratio Falls

All Manufacturing Except Semiconductors



SOURCE: Census Bureau.

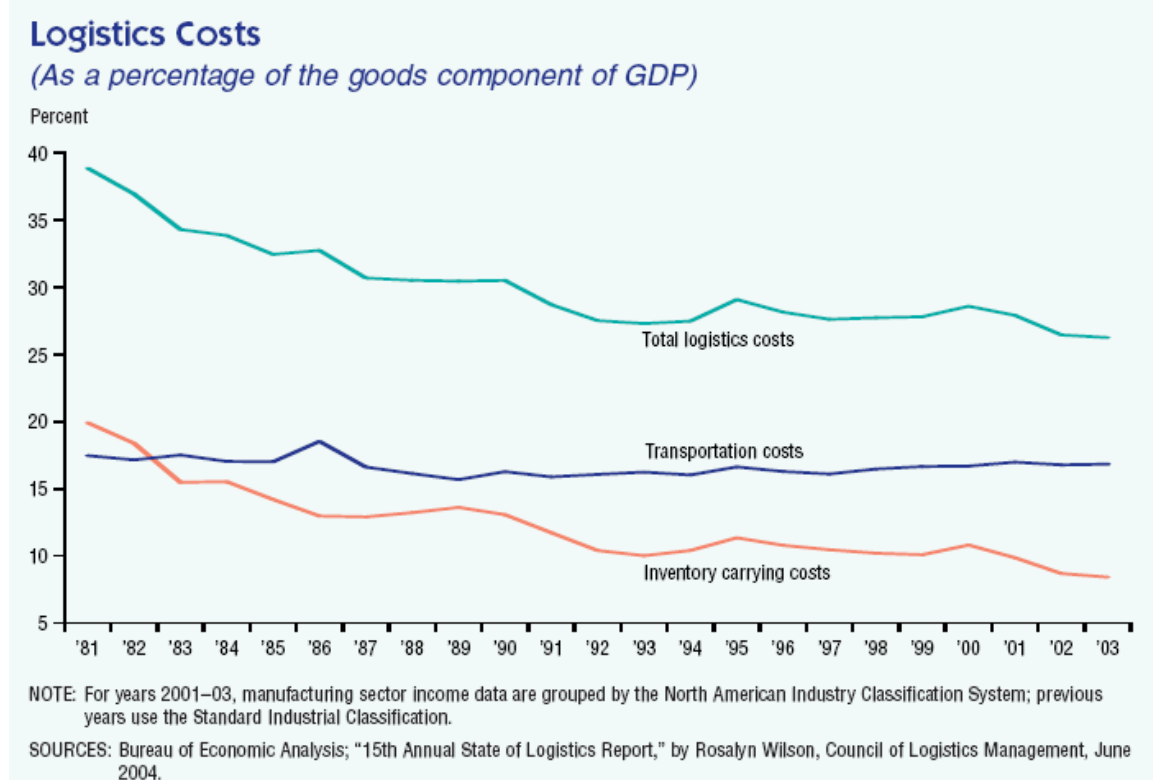
Source: Federal Reserve Bank of Dallas,
<http://www.forecastcenter.com/public/guest/New%20Econ-FRB%20Dallas%20swe0303b.pdf>

According to the Federal Reserve of Dallas, these savings have been achieved as firms moved beyond internal productivity improvements to eliminating inefficiencies in production and distribution channels. The key has been reducing inventory costs. Unused or unsold inventory create burdensome holding costs including warehouse and production-line storage costs, insurance costs and costs due to obsolescence and spoilage. At the same time, sufficient inventory must be maintained to meet demand and keep production flowing efficiently.

In the “Real Time Economy”, information means less inventory. Better information about product demand, potential bottlenecks and change orders allows less inventory to be needed throughout the supply chain. Improved supply chain operations also results in lower relative logistics costs. In the past, logistics systems focused on stored inventory (warehousing and storage). Now with information technology the goal is to get the right goods shipped to the right places “just in time,” reducing inventory storage at intermediate stages of production and distribution.

Business logistics costs in the United States were \$936 billion in 2003, roughly 8.5% of GDP. Logistics costs as a percentage of the goods-component of GDP has fallen steadily from 39% of GDP in 1981 to 26% in 2003. Transportation costs have declined by about 4% since 1981 and inventory carrying costs have declined by an even more impressive 58%.

Figure 4: Logistics Costs



Source: Federal Reserve Bank of Dallas,

<http://www.dallasfed.org/research/swe/2005/swe0502b.pdf>

The Rise of Third-Party Logistics

Logistics costs have declined because inventories are managed more efficiently. Third party logistics providers (3PLs) furnishing specialized and customized end-to-end solutions are becoming more common. Firms focusing on their core competencies may “outsource” their logistics requirements to take advantage of this new breed of logistics providers. The 3PLs handling logistics, are better able to anticipate and respond to shifts and changes in the global economy – because logistics is their core competency. This sort of specialization helps industry supply chains become more efficient as specialization can provide better expertise, longer reach, improved reliability and ongoing flexibility.

A 2004 study by Georgia Institute of Technology found that 80% of North American and European companies outsource part of their logistics operations to outside contractors up from 71% three years ago. The study found that while most companies have long outsourced such functions as freight transport and warehousing management, with the complexity of supply chains, many are now handing over larger portions of their logistical operations to third part logistics providers (3PLs). Overall, the study found more integrated logistical services by 3PL providers. (Georgia Institute of Technology, *Third Party Logistics: Results and Findings of the Eight Annual Study*)

The key to this new real time economy, however, is both the effective application of information technologies and a well developed goods movement infrastructure. E-commerce relies heavily on a sophisticated and efficient goods-movement infrastructure. The U.S. Commerce Department estimates that retail e-commerce in the second quarter of 2004 was \$15.7 billion, a 23% percent increase over the 2003 value. Delivering e-commerce goods to consumers requires a well-developed transportation and logistics infrastructure for support. In addition the rapid growth of global and especially Asian supply partners has increased the demands upon California's port and transportation infrastructure.

As a consequence of its interstate, national and international roles with these fast growing supply chains, California's goods movement industry has become one of the biggest economic engines in the state. According to a recent study by the California Business, Transportation and Housing Agency, logistics supports one out of seven California jobs and contributes more than \$200 billion per year to the State's economy. In addition, the industry produces more than \$16 billion in tax revenues to state and local government (Goods Movement Action Plan prepared by BTH and Cal EPA).

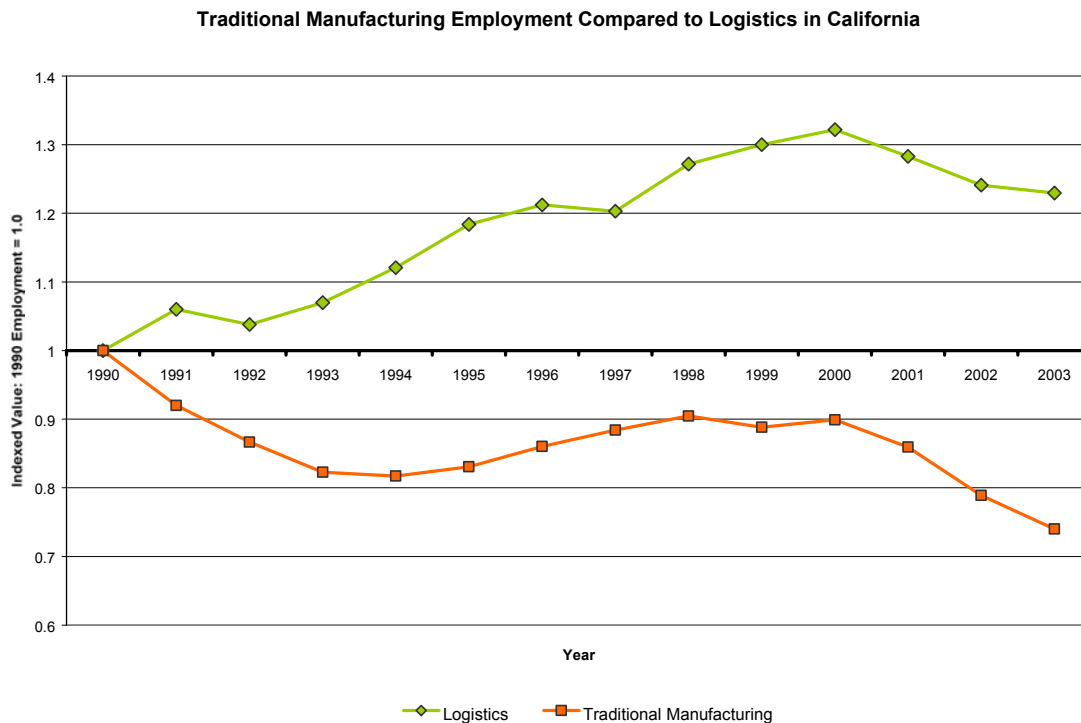
Logistics in California

Logistics is a leading industry in California, adding nearly 73,000 jobs between 1990 and 2003. Employment grew by 23% from 317,604 employees in 1990 to 390,506 employees in 2003. Logistics comprised 2.6% of all employment in the state and pays wages at about the average state level (\$42,592 for the state and \$42,475 for logistics in CA).

While logistics employment has grown since 1990, reflecting a long term structural shift in the California economy, total logistics employment declined between 2000-2003 during the recession, especially as overall manufacturing declined sharply resulting in a reduction in goods movement.

In addition, there has been a shift toward contract workers, especially in transportation services and temporary logistics workers. Both of these categories fall outside of the NAICS codes for logistic employment used in this analysis. Instead, they fall under temporary help services. Because of this, the total number of logistics workers is underestimated in this analysis.

Figure 5: Indexed traditional manufacturing and logistics employment in California



A comparison of employment growth in logistics compared to traditional manufacturing shows a key structural change to the California economy. In *Figure 5* an indexed growth value below 1 indicates a decline in employment relative to employment levels in 1990 – the earliest year for which detailed data is available. While logistics employment increased steadily from 1990 through 2000 and remained well above its 1990 levels, manufacturing employment decreased and remained below its 1990 employment level.

Logistics is a Leading Industry in California

Because this analysis focuses on the structural trends rather than the short term business cycle, it is important to note that while logistics employment was affected by recession it has grown over the entire 1990-2003 period. Moreover, California's growth in logistics outpaced growth in the same sector nationally. A shift-share analysis of logistics employment in the state finds that California provided a better home for logistics jobs in

the 1990 to 2003 period than did the same cluster nationally. Whereas US logistics employment grew 20% between 1990 and 2003, California logistics employment grew 23%. If logistics employment in California had grown at the rate of US logistics, it would have only added 62,721 jobs. Instead, California added 10,180 more logistics jobs than the national growth rate would have predicted – for a total of 72,900 jobs added between 1990 and 2003.

Logistics in California includes four key subsectors:

- *Transportation services* – the physical movement of goods from place to place by truck, air, water or rail freight transportation. Transportation services employs approximately 261,000 Californians and is 67% of all logistics employment in the state. Within transportation services, courier employment grew the fastest, averaging 11% employment growth annually from 16,200 jobs in 1990 to nearly 59,700 in 2003. Courier services have become far more concentrated in California from a concentration of .99 in 1990 to 1.42 in 2003 (i.e. employment is now 42% more concentrated in California than it is nationally). At the same time, the general category of transportation services became slightly more concentrated in California between 1990 and 2003 from .86 in 1990 to .87 in 2003. Average wages in the sector were \$41,380 in 2003.
- *Logistics support* – activities supporting transportation services including air traffic control, navigational services to ships, packing and crating and freight transportation arrangement. In 2003, California had approximately 64,000 logistics support jobs, making up about 16% of all logistics employment. Logistics support wages averaged \$48,202 – paying above the cluster average and more than average wages in California. The growth of logistics support employment outstripped growth in the same sector nationally as shown by the sectors increasing employment concentration from .90 in 1990 to .98 in 2003.
- *Warehousing and storage* – facilities storing goods and general merchandise, including more specialized activities such as refrigerated and bulk commodities storage. About 14% of all logistics employment is in warehousing and storage – and the sector employed about 56,000 in 2003. Wages in warehousing and storage were \$38,712, falling below the cluster average of \$42,475. Employment growth outpaced that of the same sector nationally, indicated by an increasing employment concentration in the sector. The warehousing and storage employment concentrated grew from .55 to .92 during the 1990 to 2003 period.
- *Supply chain management* – firms offering operating advice and assistance in productivity improvement, inventory management, production planning, quality assurance and materials handling and transport. A leading sector for the state, supply chain management is 17% more concentrated in California than its national counterpart. Employment in supply chain management firms makes up about 2% of employment in logistics and totaled about 9,500 jobs in 2003. Average wages were \$56,184, the highest in the logistics cluster.

Figure 6: Logistics Summary, California

Logistics	Employment 1990	Employment 2003	Percent change 1990 - 2003	Concentration 1990	Concentration 2003	Average pay 1990	Average pay 2003
Transportation Services	240,616	261,094	9%	0.82	0.83	\$ 42,032	\$ 41,380
Logistics Support	49,621	63,931	29%	0.90	0.98	\$ 45,253	\$ 48,202
Warehousing and Storage	21,949	55,975	155%	0.55	0.92	\$ 34,909	\$ 38,712
Supply Chain Management	5,418	9,506	75%	1.10	1.17	\$ 62,852	\$ 56,184
Logistics SUM	317,604	390,506	23%	0.80	0.87	\$ 42,398	\$ 42,475

Employment growth in California logistics outpaced the same sector nationally, as the concentration of logistics employment increased from 80% of the U.S. employment concentration in 1990 to 87% in 2003. Logistics pays an average wage of \$42,475 – which is about equal to the average wage across the state (\$42,600). Inflation-adjusted logistics wages have remained steady since 1990.

How has Logistics in California Been Changing?

Logistics in California is growing in scope and significance as statewide job creation has outpaced U.S. logistics employment.

Supply chain management is a nascent source of new job creation and has the strongest wages in the industry.

- Supply chain management is the most highly-concentrated of the logistics subsectors, at 1.17, its employment is 17% more concentrated in California than it is nationally. Supply chain management is a growing share of logistics employment, doubling from 1.7% in 1990 to 2.4% in 2003. Wages are highest in this sector averaging \$56,200 in 2003.

With outsourcing of the logistics function, California has seen 11% annual employment growth among “couriers” – firms engaged in providing air, surface, or combined courier delivery services of parcels generally between metropolitan areas or urban centers. The establishments of this industry form a network including courier local pick-up and delivery to serve their customers' needs.

- Courier services have become far more concentrated in California from a concentration of .99 in 1990 to 1.42 in 2003 (i.e. employment is now 42% more concentrated in California than it is nationally). Courier firms, e.g. Federal Express and UPS carry out third-party logistics services: providing efficient

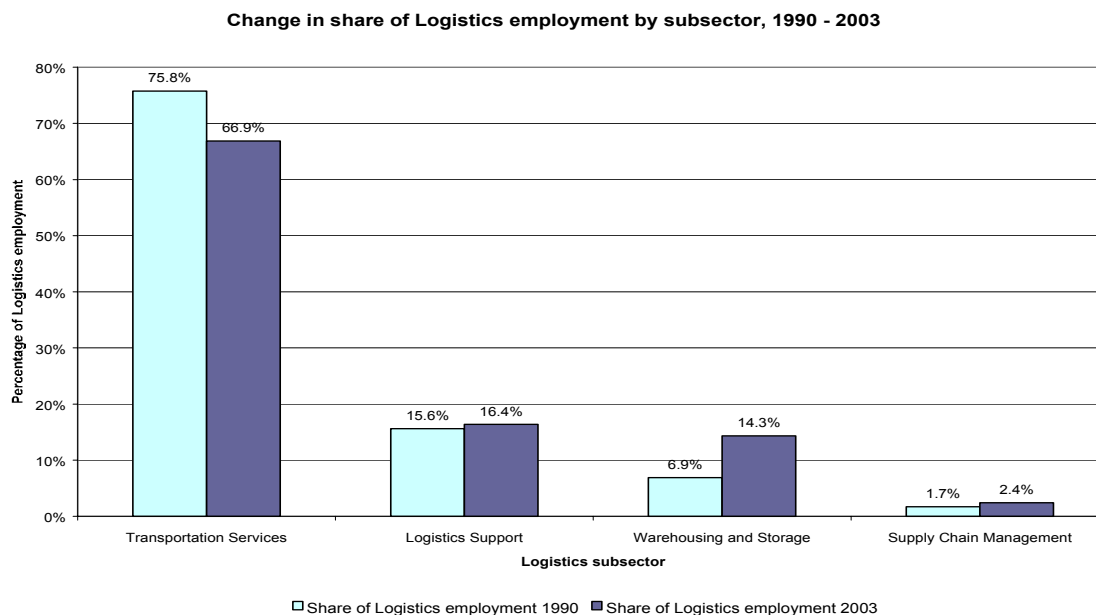
methods for sourcing, manufacturing, transporting and carrying out order fulfillment.

- Since 1990, courier employment increased from 16,176 employees to more than 59,669 in 2003. Adding more than 43,000 jobs, courier employment grew at about 11% annually between 1990 and 2003 – making it the fastest-growing logistics subsector. Courier wages averaged \$37,164 in 2003.

Employment in warehousing and storage is an increasing share of all employment while transportation services jobs are a declining share of employment.

- Warehousing and storage employment doubled from 7% of all logistics employment in 1990 to more than 14% in 2003. At the same time, warehousing and storage employment became more concentrated in California rising from .55 to .92 during the thirteen-year period from 1990 to 2003.
- Transportation services is a declining share of cluster employment from 76% in 1990 to 67% in 2003.

Figure 7: Logistics Employment by Subsector, California



Source: Bureau of Labor Statistics

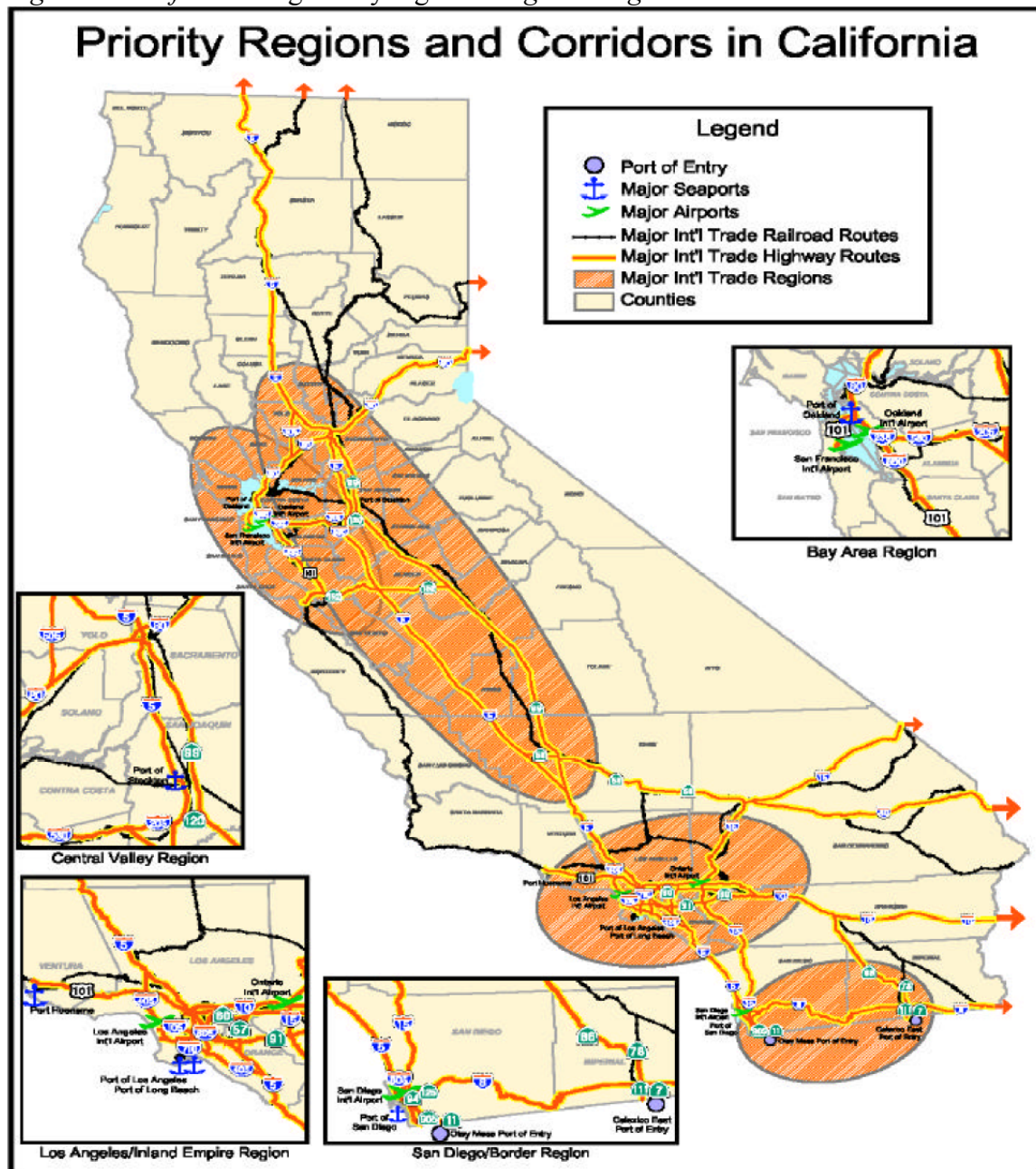
Regional Trends in California's Goods Movement System

Four urban regions function as the key “nodes” in California’s goods movement network: Los Angeles/Inland Empire, the Bay Area, San Diego/Border, and the Central Valley. These four “gateway regions” were identified in the *Goods Movement Action Plan* draft report prepared by the Business, Transportation, and Housing Agency and the CA

Environmental Protection Agency in January, 2005. The California goods movement system consists of a physical network of highways, rail lines, seaports, airports, and border crossings that link California's primary gateway regions to each other and to the rest of the nation.

The "priority regions" identified in the study are shown on the map, below.

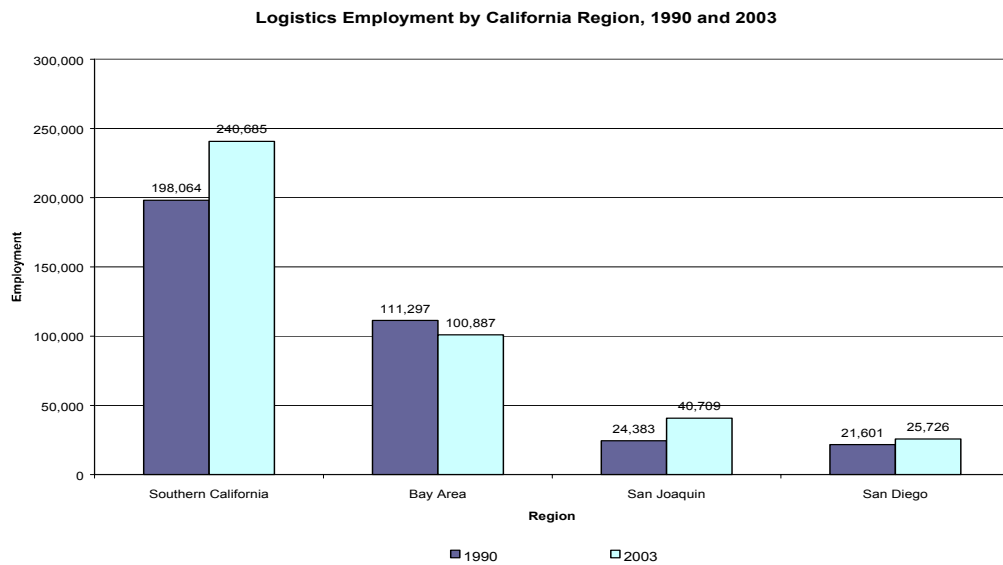
Figure 8: California's "gateway regions" regional logistics networks and nodes



Source: *Goods Movement Action Plan* draft report prepared by the Business, Transportation, and Housing Agency and the CA Environmental Protection Agency in January, 2005

Of the four regions, logistics employment in Southern California is by far the largest, with about 59% of all logistics employment in the state. Bay Area logistics employment declined by 9% between 1990 and 2003. More than 41,000 logistics jobs were in the San Joaquin region in 2003 – and the region is an increasingly important corridor supplying logistics support. Finally, San Diego/Border is the smallest of the four regions, employing about 6% of the California logistics workforce.

Figure 9: Logistics employment by region



Source: Bureau of Labor Statistics

Southern California

The Southern California region consists of five counties, Ventura, Los Angeles, Orange, San Bernardino, and Riverside. Compared to California's other regions, Southern California has the largest number of jobs in logistics, approximately 240,000 in 2003 – about 59% of all logistics jobs in California. Employment grew by 22% from about 198,000 in 1990 to 240,700 in 2003.

Figure 10: Southern California Logistics employment

Logistics employment by subsector						
Southern California	1990	2003	Employment Change 1990 - 2003	% Employment in Subsector, 1990	% Employment in Subsector, 2003	Employment Concentration, 2003
Transportation services	148,456	152,022	2%	75%	63%	0.88
Logistics support	34,478	53,751	56%	17%	22%	1.62
Warehousing and storage	11,917	29,575	148%	6%	12%	1.05
Supply chain management	3,213	5,337	66%	2%	2%	1.42
<i>Logistics</i>	198,064	240,685	22%	100%	100%	1.01

Source: Bureau of Labor Statistics, Collaborative Economics

The logistics support subsector is the most highly-concentrated logistics sector in Southern California with a location quotient of 1.62 compared with the same sector nationally. Logistics support added the largest number of jobs (19,300) from 34,500 in 1990 to about 53,750 in 2003 – an increase of 56%. Within logistics support, job gains were entirely made in support activities for transportation: e.g. air traffic control services, marine cargo handling, and motor vehicle towing.

Employment in warehousing and storage is 5% more concentrated in Southern California than it is nationally. Firms added more than 17,000 jobs to the regional economy, growing from 11,900 in 1990 to more than 29,600 jobs in 2003. In addition, warehousing and storage was an increasing share of all Southern California logistics employment doubling from 6% of regional logistics employment in 1990 to more than 12% by 2003. Wages in warehousing and storage averaged \$38,844 in 2003.

Transportation services employment churned, growing just 2% between 1990 and 2003 from about 148,450 jobs to more than 152,000. Employment in transportation services likely shifted from firms specializing in long distance freight trucking, postal services and air freight transportation to “courier” firms carrying out the third party logistics function in the period from 1990 to 2003. Within the transportation services subsector, job losses occurred among companies specializing in long distance freight trucking (11,700 jobs), air transportation (8,600 jobs), postal service (4,600 jobs). However, courier employment (e.g. firms conducting third-party logistics services such as UPS and Federal Express) accounted for 76% of the job growth, adding 21,700 jobs from 7,997 in 1990 to 29,700 in 2003. Jobs in courier firms paid wages averaging \$36,064.

Figure 11: Southern California detailed logistics employment and wages

Southern California: Detailed Employment Growth and Wages

NAICS Code	Industry	Job Change 1990 - 2003	Wages, 2003	Southern California
481	Air transportation	-8629	\$ 55,072	0.91
4821	Rail transportation	8	\$ 25,486	0.38
483	Water transportation	-104	\$ 44,561	0.59
48411	General freight trucking, local	1948	\$ 37,877	1.17
48412	General freight trucking, long distance	-11691	\$ 39,700	0.49
484220	Specialized freight (except used goods) trucking, Local	2094	\$ 38,383	1.19
484230	Specialized freight (except used goods) trucking, Long distance	693	\$ 46,488	0.46
486	Pipeline transportation	147	\$ 78,922	0.32
491110	Postal service	-4600	\$ 49,040	0.92
492110	Couriers	21713	\$ 36,064	1.07
492210	Local messengers and local delivery	1987	\$ 19,759	2.51
Transportation services		3566	\$ 43,291	0.88
488	Support activities for transportation	19957	\$ 51,965	1.64
522293	International trade financing	-653	\$ 56,669	0.94
532411	Commerical air, rail and water transportation equipment rental and l	-31	\$ 119,047	0.50
Logistics support		19273	\$ 52,305	1.62
4931	Warehousing and storage	17658	\$ 38,844	1.05
Warehousing and storage		17658	\$ 38,844	1.05
541614	Process, physical distribution, and logistics consulting services	2124	\$ 55,319	1.42
Supply chain management		2124	\$ 55,319	1.42

Southern California's employment in supply chain management is 42% more concentrated when compared with the same sector nationally. Supply chain management employment paid \$55,319 on average in 2003 and employed more than 5,300 southern Californians. Employment in supply chain management grew 66%, adding 2,124 jobs between 1990 and 2003.

Bay Area

The Bay Area region consists of nine counties, Santa Clara, San Mateo, Napa, Sonoma, Marin, San Francisco, Contra Costa, Alameda and Santa Cruz. The Bay Area makes up about 25% of all logistics employment in California with slightly more than 100,000 employees in 2003. Of the four primary logistics regions in the state, the Bay Area is the only one to lose jobs, falling 9% from 111,300 in 1990 to 100,900 in 2003. Average logistics wages were approximately \$50,000 in the Bay Area in 2003.

Roughly 75% of Bay Area logistics employment was in transportation services, followed by 17% of employment in logistics support and 6% in warehousing and storage. The smallest subsector is supply chain management with just 1.3% of employment. Only logistics support employment is more concentrated than the same sector nationally, with 12% more employment in the Bay Area.

Transportation services, with a .95 employment concentration, is less concentrated in the Bay Area than it is nationally. The Bay Area gained nearly 9,500 jobs among courier firms, likely resulting from a shift in employment towards third party logistics. However, despite these gains, the transportation services sector overall lost employment, falling 16% from 90,300 jobs in 1990 to about 76,100 in 2003. Job losses occurred in air, rail and water transportation services, general freight trucking and in some specialized freight trucking services.

Figure 12: Bay Area Logistics employment

Logistics employment by subsector						
Bay Area	1990	2003	Employment Change 1990 - 2003	% Employment in Subsector, 1990	% Employment in Subsector, 2003	Employment Concentration, 2003
Transportation services	90,293	76,104	-16%	81%	75%	0.95
Logistics support	15,523	17,313	12%	14%	17%	1.12
Warehousing and storage	4,090	6,134	50%	3.7%	6.1%	0.47
Supply chain management	1,391	1,336	-4%	1.2%	1.3%	0.77
<i>Logistics</i>	111,297	100,887	-9%	100%	100%	0.91

Source: Bureau of Labor Statistics, Collaborative Economics

Logistics support employment is 12% more concentrated in the Bay Area than it is nationally. The subsector added about 1,800 jobs between 1990 and 2003, for a 12% gain overall. Within logistics support, support activities for transportation including air traffic control services, marine cargo handling, and motor vehicle towing gained approximately 1,700 jobs while 190 jobs were added in international trade financing, a very high-paying sector.

Figure 13: Bay Area detailed logistics employment and wages

Bay Area: Detailed Employment Growth and Wages

NAICS Code	Industry	Job Change 1990 - 2003	Average Wages, 2003	2003 Employment Concentration
481	Air transportation	-7780	\$ 55,534	1.77
483	Water transportation	-2189	\$ 92,018	0.77
48411	General freight trucking, local	-2553	\$ 41,143	0.71
48412	General freight trucking, long distance	-7874	\$ 38,405	0.22
484220	Specialized freight (except used goods) trucking, Local	-162	\$ 37,448	0.72
484230	Specialized freight (except used goods) trucking, Long distance	296	\$ 38,124	0.21
486	Pipeline transportation	73	\$ 64,083	0.07
491110	Postal service	-3235	\$ 49,622	1.18
492110	Couriers	9471	\$ 41,261	1.10
492210	Local messengers and local delivery	-236	\$ 33,237	1.57
Transportation services		-14189	\$ 48,430	0.95
488	Support activities for transportation	1688	\$ 53,458	1.10
522293	International trade financing	193	\$ 184,034	2.12
532411	Commercial air, rail and water transportation equipment rental and l	-91	\$ 130,520	1.71
Logistics support		1790	\$ 58,042	1.12
4931	Warehousing and storage	2044	\$ 41,615	0.47
Warehousing and storage		2044	\$ 41,615	0.47
541614	Process, physical distribution, and logistics consulting services	-55	\$ 75,121	0.77
Supply chain management		-55	\$ 75,121	0.77

Source: Bureau of Labor Statistics, Collaborative Economics

Bay Area employment in warehousing and storage grew by 50% from 4,100 jobs in 1990 to 6,100 in 2003. Warehousing and storage became a larger share of logistics employment overall, rising from 4% in 1990 to 6% in 2003. Wages in this subsector were approximately \$41,600 – nearly the same as California’s average wage of \$42,600.

The Bay Area’s supply chain management subsector lost 55 jobs between 1990 and 2003, falling 4% from 1,391 to 1,336 in 2003. Supply chain management wages (\$75,121) were very high relative to average logistics wages in the Bay Area (\$50,000).

San Joaquin Region

The San Joaquin region is made up of eight counties: San Joaquin, Stanislaus, Merced, Fresno, Madera, Kings, Tulare and Kern. The San Joaquin has captured a growing share of all California logistics employment rising from 7% in 1990 to more than 10% in 2003 – and the region is just shy (.95) of an employment concentration equal to that of the U.S. in logistics. Jobs increased by 67% from 24,400 in 1990 to more than 40,700 in 2003. On average, wages across the sector fell 22% below the California logistics average, and stayed at \$37,500 in 2002.

Figure 14: San Joaquin Logistics employment

Logistics employment by subsector						
San Joaquin	1990	2003	Employment Change 1990 - 2003	% Employment in Subsector, 1990	% Employment in Subsector, 2003	Employment Concentration, 2003
Transportation services	20,497	27,243	33%	84%	67%	0.87
Logistics support	2,020	3,532	75%	8.3%	9%	0.59
Warehousing and storage	1,852	9,841	431%	7.6%	24%	1.94
Supply chain management	14	93	564%	0.1%	0.2%	0.14
<i>Logistics</i>	24,383	40,709	67.0%	100%	100%	0.95

Source: Bureau of Labor Statistics, Collaborative Economics

The transportation services subsector employed about 27,250 in the San Joaquin in 2003 67% of all employment in logistics. Transportation services grew by 33% from about 20,500 jobs in 1990 to more than 27,200 in 2003. Couriers, and local specialized and general freight trucking accounted for 81% of job growth between 1990 and 2003. The wages in these sectors averaged somewhere between \$34,000 and \$35,500 annually. Despite adding more than 6,700 jobs, the percentage of transportation services employment declined from 84% of all logistics employment in the San Joaquin in 1990 to 67% in 2003. Average wages in transportation services were approximately \$37,500 in 2003.

Logistics support added about 1,500 jobs – increasing from about 2,000 jobs in 1990 to more than 3,500 in 2003. Jobs in this subsector paid wages nearing \$37,300 on average in 2003.

Warehousing and storage employment is highly concentrated in the San Joaquin region, with an employment concentration of 1.94 in 2003. Jobs grew from 1,852 jobs in 1990 to more than 9,800 in 2003. The second-fastest growing employment subsector in logistics, warehousing and storage jobs paid \$37,350 on average in 2003.

About 80 jobs in supply chain management firms were added between 1990 and 2003 – for a total of 93 jobs by 2003. Average wages were about \$35,400 in 2003.

Figure 15: San Joaquin detailed logistics employment and wages

San Joaquin: Detailed Employment Growth and Wages				
NAICS Code	Industry	Job Change 1990 - 2003	Average Wages, 2003	2003 Employment Concentration
481	Air transportation	743	\$ 36,016	0.15
48411	General freight trucking, local	1111	\$ 34,744	1.99
48412	General freight trucking, long distance	-839	\$ 37,625	0.81
484220	Specialized freight (except used goods) trucking, Local	2051	\$ 34,112	3.42
484230	Specialized freight (except used goods) trucking, Long dista	419	\$ 40,503	0.90
486	Pipeline transportation	87	\$ 73,520	0.21
491110	Postal service	589	\$ 43,680	0.81
492110	Couriers	2336	\$ 35,982	0.53
492210	Local messengers and local delivery	249	\$ 22,053	0.72
Transportation services		6746	\$ 37,568	0.87
488	Support activities for transportation	1512	\$ 37,337	0.60
Logistics support		1512	\$ 37,337	0.59
4931	Warehousing and storage	7989	\$ 37,350	1.94
Warehousing and storage		7989	\$ 37,350	1.94
541614	Process, physical distribution, and logistics consulting servi	79	\$ 35,379	0.14
Supply chain management		79	\$ 35,379	0.14

Source: Bureau of Labor Statistics, Collaborative Economics

San Diego/Border Region

The San Diego/Border region consists of San Diego and Imperial counties. San Diego logistics has just 6% of California logistics employment or about 25,700 logistics jobs in 2003. About 68% of these jobs are in transportation services and 19% are in logistics support. San Diego logistics employment grew by 19% between 1990 and 2003, increasing from 21,600 to more than 25,700 jobs in 2003. Average wages were \$41,138 in 2003.

Figure 16: San Diego: logistics employment

Logistics employment by subsector						
San Diego	1990	2003	Employment Change 1990 - 2003	% Employment in Subsector, 1990	% Employment in Subsector, 2003	Employment Concentration, 2003
Transportation services	16,876	17,475	4%	78%	68%	0.53
Logistics support	3,541	4,953	40%	16%	19%	0.78
Warehousing and storage	898	2,644	194%	4%	10%	0.49
Supply chain management	286	654	129%	1%	3%	0.91
Logistics	21,601	25,726	19.1%	100%	100%	0.57

Source: Bureau of Labor Statistics, Collaborative Economics

Falling within the transportation services subsector, the largest employment gains were made among couriers, which added more than 2,600 jobs between 1990 and 2003. These jobs paid \$33,450 on average in 2003. Local freight trucking and local messengers and delivery also added jobs, 516 and 255 respectively.

Warehousing and storage firms added more than 1,700 jobs between 1990 and 2003 and paid wages averaging \$44,350 in 2003. Compared with the U.S., jobs in warehousing and storage are not highly concentrated in San Diego (.49).

Jobs in supply chain management firms increased from 286 in 1990 to 654 in 2003—paying wages that averaged \$46,643 in 2003. Supply chain management employment is 91% of the U.S. employment concentration in San Diego.

Figure 17: San Diego detailed employment and wages

San Diego: Detailed Employment Growth and Wages				
Industry		Job Change 1990 - 2003	Average Wages, 2003	2003 Employment Concentration
481	Air Transportation	-2287	\$ 38,143	0.35
483	Water transportation	-134	\$ 57,479	0.05
48411	General freight trucking, local	516	\$ 34,395	0.59
48412	General freight trucking, long distance	-863	\$ 35,274	0.18
484220	Specialized Freight (except Used Goods) Trucking, Local	510	\$ 32,892	0.88
484230	Specialized Freight (except Used Goods) Trucking, Long-Distance	18	\$ 48,176	0.11
491110	Postal Service	-39	\$ 47,812	0.85
492110	Couriers	2623	\$ 33,446	0.68
492210	Local Messengers and Local Delivery	255	\$ 20,882	1.01
Transportation services		599	\$ 39,660	0.53
488	Support activities for transportation	1572	\$ 44,035	0.80
532411	Commercial Air, Rail, and Water Transportation Equipment Rental and I	-160	\$ 23,475	0.33
Logistics support		1412	\$ 43,906	0.78
4931	Warehousing and storage	1746	\$ 44,353	0.49
Warehousing and storage		1746	\$ 44,353	0.49
541614	Process, Physical Distribution, and Logistics Consulting Services	368	\$ 46,643	0.91
Supply chain management		368	\$ 46,643	0.91

Source: Bureau of Labor Statistics, Collaborative Economics

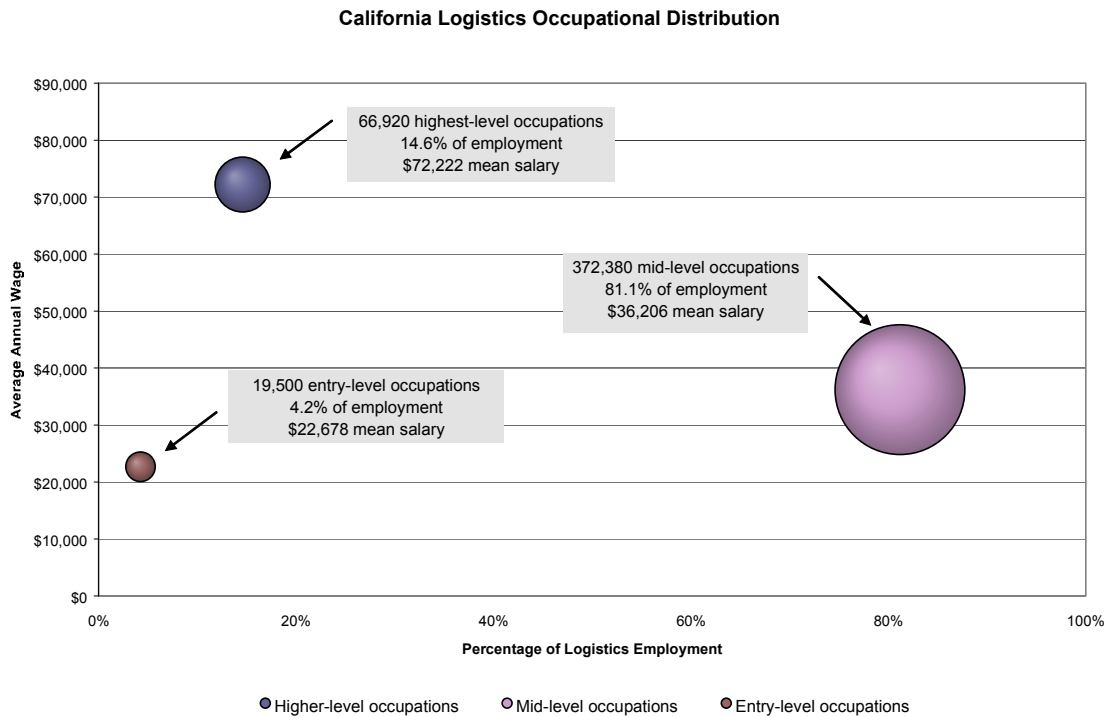
What Logistics Workers Do: Occupational Analysis

Employment figures broken out by functional areas and occupations indicate that within logistics about 35% of all jobs are in office and administrative support occupations and more than 45% of logistics occupations are in transportation and material moving occupations statewide.

Within specific functions, the occupational pattern varies, but in each case the majority of logistics jobs (81%) offer mid-level wages, with salaries ranging from just over \$27,000 to approximately \$48,000. About 14.6% of logistics jobs are at the higher-level, paying

wages from \$48,000 to \$155,000. Just 4.2% of logistics jobs offer entry-level wages, paying between 16,400 to just above \$27,000.

Figure 18: Occupational Distribution



Source: California Employment Development Department, Labor Market Information Division

More than 14% of logistics occupations were at the highest-level – paying wages above \$23.68 per hour or between \$49,264 and \$155,438 annually. Nearly 11% of these occupations were first line supervisors of machine and vehicle transportation and material-moving; another 11% were aircraft mechanics and service technicians. About 5% of the highest-level occupations were transportation, storage, and distribution managers.

Mid-level occupations include 19% heavy and tractor-trailer truck drivers, 16% postal sorters and mail carriers, and 13% laborers moving and freight, stock, and material. Mid-level occupations pay hourly wages ranging from \$13 to \$23 dollars per hour (excluding benefits, stock options and bonuses).

There were approximately 19,500 entry-level jobs in logistics in 2004 paying wages ranging from \$7.86 to \$12.92 per hour. Couriers and messengers make up about 40% of entry-level logistics employment while hand packers and packagers were nearly 20%.

Figure 19: Illustrative examples of logistics occupations by wage level

Illustrative Examples of Logistics Occupations with Average Wages

Occupation	Average Annual Wage	Average Hourly Wage
Higher-level occupations		
Airline Pilots, Copilots, and Flight Engineers	\$137,847	\$66.27
Railroad Conductors and Yardmasters	\$60,679	\$29.17
Logisticians	\$57,004	\$27.41
Bus and Truck Mechanics and Diesel Engine Specialists	\$44,895	\$21.58
Cargo and Freight Agents	\$40,865	\$19.65
Postal Service Mail Sorters, Processors, and Processing Machine Operat	\$38,828	\$18.67
Industrial Truck and Tractor Operators	\$37,868	\$18.21
Mid-level occupations		
Dispatchers, Except Police, Fire, and Ambulance	\$37,446	\$18.00
Truck Drivers, Heavy and Tractor-Trailer	\$36,957	\$17.77
Production Occupations	\$34,861	\$16.76
Truck Drivers, Light or Delivery Services	\$30,225	\$14.53
Laborers and Freight, Stock, and Material Movers, Hand	\$28,502	\$13.70
Conveyor Operators and Tenders	\$28,031	\$13.48
Office Clerks, General	\$27,218	\$13.09
Entry-level occupations		
Machine Feeders and Offbearers	\$26,567	\$12.77
Counter and Rental Clerks	\$26,306	\$12.65
Cleaners of Vehicles and Equipment	\$26,000	\$12.50
File Clerks	\$25,497	\$12.26
Packers and Packagers, Hand	\$23,097	\$11.10
Transportation Attendants, Except Flight Attendants and Baggage Porte	\$22,452	\$10.79
Couriers and Messengers	\$19,946	\$9.59

Source: California Employment Development Department, Labor Market Information Division

Demand for Logistics Strains Good Movements while Creating Job Opportunities

While there are increasing opportunities for jobs within logistics in California, the recent growth in supply chain demand, especially within the transportation and distribution has created a major strains on the infrastructure for California's ports, freight systems and highways. While information systems have created an advanced logistics system with streamlined supply chains, it is still critical to get just-in-time inventory to manufacturers and products to consumers on a real time basis. There is evidence that rapid increases in trade volume, especially from Asia is outpacing port capacity. For example, container

traffic from Asia to the US increased by 14% in 2004. In October 2004, a combination of this surge in cargo volume and a labor shortage meant 94 ships had wait offshore to be unloaded at the ports of Long Beach and Los Angeles.

According to the Goods Movement Action Plan prepared by the California Business, Transportation and Housing Agency and Cal EPA, “global trends are converging to create opportunities for growth over the next 15 years. Shipments of containers are poised to double over the next 15 years and, perhaps, triple over the next 20 years. To meet this challenge, California’s ports have engaged long-term expansion programs to accommodate larger ships and improve dockside facilities to load and unload ships. However, by the mid 1980s, it became apparent that constraints to throughput capability in the future would have to come from infrastructure limits outside the ports. In accommodating prospects, most infrastructure initiatives have focused on reducing congestion on and adding capacity to the rail and highway elements of the state’s four “port to border” goods movement corridors” p. ES-1

The Pacific Maritime Association (PMA) which represents US west cost ports maintains that the Long Beach/Los Angeles problems this year were due to insufficient availability of workforce. PMA has now started to hire and train 3,000 new staff for Southern California ports to alleviate congestion. According to *International Trade Trends and Impacts: the Southern California region*, a May, 2005 report of the Los Angeles County Economic Development Corporation, international trade will place a greater demand on the region’s ports and transportation infrastructure in the coming year. The total value of two-way trade is expected to rise by more than 14% while container activity will increase by nearly 10%. Given these increasing demands on the port system, there is some concern that congestion problems encountered in 2004 are bound to flare up again in the near future.

Another example of the growing importance of logistics to the new manufacturing value chain can be seen in the case of the New United Motors (NUMMI) facility established in the Bay Area as a joint venture between Toyota and GM which depends on just-in-time delivery of parts. When the West Coast Ports went on strike for a short time in 2003, it had a major impact on NUMMI and other manufacturers who increasingly depend on a just in time manufacturing and distribution system.

There appears to be a growing demand for all levels of employment within logistics across California. A recent search of the website Logistics.Com found roughly 950 open positions in logistic careers in California posted on June 17, 2005.

Recent occupational projections from the California Employment Development Department anticipate growth in many logistics occupations. For example, transportation and material moving occupations (45% of logistics work in California) are projected to add more than 156,000 new jobs between 2002 and 2012 – reaching annual growth of 1.5%. This category includes truck drivers, transportation workers, and packers and packagers, among others.

Even more importantly, projected demand for logistics occupations cuts across all skill levels, as shown in *Figure 20*, below. There is demand for entry, mid- and higher-level skills throughout the logistics cluster. Many entry-level jobs offer advancement potential with little additional training beyond high-school required. Mid- and higher-level occupations pay better wages and often require substantial on the job training as well as education beyond high school in some cases.

Figure 20: Projected (2012) employment needs in California logistics occupations. (note, selected occupations are illustrative)

Occupational Titles	2002 Employment	2012 Projected Employment	Numerical Change	% Change	Separations	Median Hourly Wage*	Education & Training Levels	Annual Growth Rate
Entry-level occupations								
Packers and Packagers, Hand	115,000	134,500	19,500	17.0%	21,500	\$8.10	Short-Term OJT (11)	1.6%
Laborers and Freight, Stock, and Material Movers,	264,300	293,900	29,600	11.2%	86,400	\$9.29	Short-Term OJT (11)	1.1%
Packaging and Filling Machine Operators and	43,800	54,500	10,700	24.4%	8,700	\$9.34	Short-Term OJT (11)	2.2%
Truck Drivers, Light or Delivery Services	104,300	127,100	22,800	21.9%	9,600	\$11.79	Short-Term OJT (11)	2.0%
Conveyor Operators and Tenders	7,000	8,200	1,200	17.1%	2,000	\$12.11	Short-Term OJT (11)	1.6%
Mid-level occupations								
Truck Drivers, Heavy and Tractor-Trailer	121,900	150,900	29,000	23.8%	19,900	\$17.11	Moderate-Term OJT (10)	2.2%
Cargo and Freight Agents	10,600	12,100	1,500	14.2%	2,400	\$17.63	Moderate-Term OJT (10)	1.3%
First-Line Supervisors/ Managers of Helpers, Laborers, and Material Movers, Hand	16,600	19,000	2,400	14.5%	3,900	\$20.34	Work Experience (8)	1.4%
Transportation Workers, All Other	7,600	9,500	1,900	25.0%	2,300	\$20.48	Short-Term OJT (11)	2.3%
Higher-level occupations								
Captains, Mates, and Pilots of Water Vessels	1,800	1,900	100	5.6%	500	\$22.08	Work Experience (8)	0.5%
and Material-Moving Machine and Vehicle Operators	23,400	26,300	2,900	12.4%	5,500	\$23.84	Work Experience (8)	1.2%
Transportation Inspectors	2,200	2,400	200	9.1%	500	\$26.51	Work Experience (8)	0.9%
Locomotive Engineers	1,700	1,800	100	5.9%	500	\$27.52	Work Experience (8)	0.6%
Airfield Operations Specialists	1,200	1,300	100	8.3%	300	\$27.56	Long-Term OJT (9)	0.8%
Crane and Tower Operators	3,500	4,300	800	22.9%	800	\$30.53	Moderate-Term OJT (10)	2.1%
Ship Engineers	1,000	1,200	200	20.0%	400	\$31.73	Post-Sec. VocEd (7)	1.8%
Transportation, Storage, and Distribution Managers	9,800	11,800	2,000	20.4%	1,900	\$33.35	Work Experience (8)	1.9%
Air Traffic Controllers	2,200	2,500	300	13.6%	600	\$52.54	Long-Term OJT (9)	1.3%

Source: California Employment Development Department, Labor Market Information Division

Policy Implications

The State of California and its regions need to understand the opportunity presented by the growth of logistics as part of globally competitive manufacturing value chains and invest in the workforce and infrastructure require to meet increasing demand.

Workforce Policy: Logistics Training Partnerships

The California workforce system needs to be redesigned to assist individuals in managing these transitions. While current programs provide elements of the necessary assistance, they do not utilize real time information to work as a system in order to meet the greatest needs.

Within manufacturing, assembly workers have been losing their jobs due to productivity gains as well as shifts in global demand. Regions should have the discretion to design innovative partnerships involving Workforce Investment Boards, community colleges and other training institutions to help prepare dislocated assembly workers for jobs in other growing clusters such as logistics.

The program for logistics worker career training in Gateway Cities is an example of the potential for this kind of innovative partnership. The Gateway Cities Partnership, based in the region of Southern California around the Port of Long Beach, encourages the development of logistics training programs to meet growing employment opportunities for entry-, middle-, and higher-level occupations. In Los Angeles County alone, logistics grew by 6,950 from 1997 to 2004. The challenge is to prepare a region with relatively low educational attainment (58% of the adult population has a high school education or less) for employment opportunities in growth occupations. The Gateway Cities Partnership works with local institutions to develop career pathways, helping workers move upwards from office, administrative, and stock, positions to accounting, customer service, and dispatcher positions and then on to first line supervisors for transportation and materials movement and eventually into higher level management, research and logistic analyst positions.

California Labor and Workforce Development Agency and the California Workforce Investment Board should stimulate similar kinds of workforce partnership “intermediaries” to accelerate the speed and scope of change. These regionally-based intermediaries would involve partnering among Workforce Investment Boards, community colleges, universities, and health providers. A national study by the Ford Foundation-funded Partnership for Employer-Employee Responsive Systems of over 200 examples of workforce intermediaries found that they can effectively help create skill standards and career paths, improve the workforce development system, and “assume some of the business risk and reduce the fixed labor costs associated with training and recruitment” (*Workforce Intermediaries: Generating Benefits for Employers and Workers*, 2003, p. 7).

Even under the best circumstances, public institutions have difficulty making substantial investments in capacity to serve emerging or rapidly-changing workforce needs. Many have ramped up capacity only to find that employers needs have shifted, and the programs are no longer in great need. For all the right reasons, intermediaries offer individual institutions the ability to participate in a way that shares the risk and allows flexibility, but also meets regional needs more quickly and effectively. Intermediaries can offer the flexibility to shorten the time for developing industry-responsive curriculum, offer “open entry/open exit” based on competency-based outcomes and certifications instead of set class schedules, and allow for continuing learning anytime or place beyond the classroom. Employers also limit their risk and spread out the cost by investing in an intermediary.

Experiments are already being pursued in regions across the state with some success (e.g., the Paradigm program for health professions in the San Joaquin Valley), as well as in other states across the country. However, these efforts have been small in scale. A major scaling-up of the most effective initiatives and state and regional seed money for innovative efforts that have strong employer involvement and investment would be bold steps in the right direction. If this requires temporarily changing the rules to meet an urgent need, then new approaches should be allowed at least for a short time period with evaluation of results. In some cases, this may require creating intermediary training institutions that allow federal and state funding and community college resources to be tapped in innovative ways to meet urgent demand.

Promoting “Triple Bottom Line Economic Benefits” from Investments in Goods Movement and Logistics Infrastructure

There is a “triple bottom line economic benefit” to investing in goods movement infrastructure and workforce opportunities in logistics occupations:

- Economic benefits in terms of lower prices and higher productivity;
- Equity benefits for logistics workers who meet growing demand for higher skills and move up the occupational ladder; and,
- Environmental benefits from improved efficiency, reduced waste and bottlenecks in supply chains based on investments in transportation and trade infrastructure.

The public and private sector need to work together to create a goods movement strategy that will 1) use available resources in a coordinated and targeted manner to invest in infrastructure that has maximum economic benefit; 2) identify better investment models, such as the Alameda Corridor model, for public/private investments and better utilization of assets owned by State government (begin with an inventory of state assets related to infrastructure); and, 3) get beyond localism to support infrastructure of statewide significance and demands, especially regarding telecommunications/information and inter-modal goods movement. This applies also to water transfer systems as well as housing.

Convene key decision-makers to 1) identify new sources of funds and new financing methods; 2) develop a planning-driven method versus a project-based approach; and, 3) develop a return-on-investment accountability method for infrastructure investment.

One of the key question that is created by the growth of the supply chains and the private sector cost saving from reduced inventory and warehousing cost, the implicit cost shift from the private sector to the public sector to provide the infrastructure for this new goods movement system. This requires new kinds of public-private partnerships.

This investment approach to infrastructure will create bottom line benefits for California as well California workers in logistics essential for California's "Real Time Economy."

Appendix: NAICS-based Definition of California Logistics

NAICS

Code *Transportation Services*

481112	Scheduled Freight Air Transportation
481212	Nonscheduled Chartered Freight Air Transportation
481219	Other Nonscheduled Air Transportation
482111	Line-Haul Railroads
482112	Short Line Railroads
483111	Deep Sea Freight Transportation
483112	Deep Sea Passenger Transportation
483113	Coastal and Great Lakes Freight Transportation
483211	Inland Water Freight Transportation
483212	Inland Water Passenger Transportation
484110	General Freight Trucking, Local
484121	General Freight Trucking, Long-Distance, Truckload
484122	General Freight Trucking, Long-Distance, Less Than Truckload
484220	Specialized Freight (except Used Goods) Trucking, Local
484230	Specialized Freight (except Used Goods) Trucking, Long-Distance
486110	Pipeline Transportation of Crude Oil
486210	Pipeline Transportation of Natural Gas
486910	Pipeline Transportation of Refined Petroleum Products
486990	All Other Pipeline Transportation
491110	Postal Service
492110	Couriers
492210	Local Messengers and Local Delivery

Logistics Support

488111	Air Traffic Control
488119	Other Airport Operations
488190	Other Support Activities for Air Transportation
488210	Support Activities for Rail Transportation
488310	Port and Harbor Operations
488320	Marine Cargo Handling
488330	Navigational Services to Shipping
488390	Other Support Activities for Water Transportation
488490	Other Support Activities for Road Transportation
488510	Freight Transportation Arrangement
488991	Packing and Crating
488999	All Other Support Activities for Transportation
522293	International Trade Financing
532411	Commercial Air, Rail, and Water Transportation Equipment Rental and L

Warehousing and Storage

493110	General Warehousing and Storage
493120	Refrigerated Warehousing and Storage
493130	Farm Product Warehousing and Storage
493190	Other Warehousing and Storage

Supply Chain Management

541614	Process, Physical Distribution, and Logistics Consulting Services
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